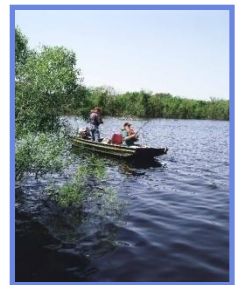
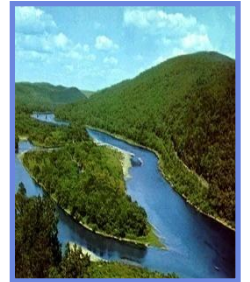


# North Central Tennessee - Water Supply Plan Modeling

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# Reliability Criteria

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- Preserve 20% of storage in all historic droughts
  - To account for climate change, droughts more severe than those in the record, and inaccuracies in streamflow and precipitation estimates
- Invoke drought plan restrictions no more often than once every 7 – 10 years
- Firm yield analysis does not account for reserve storage, or for seasonal demand patterns and assumes that inflows are perfect

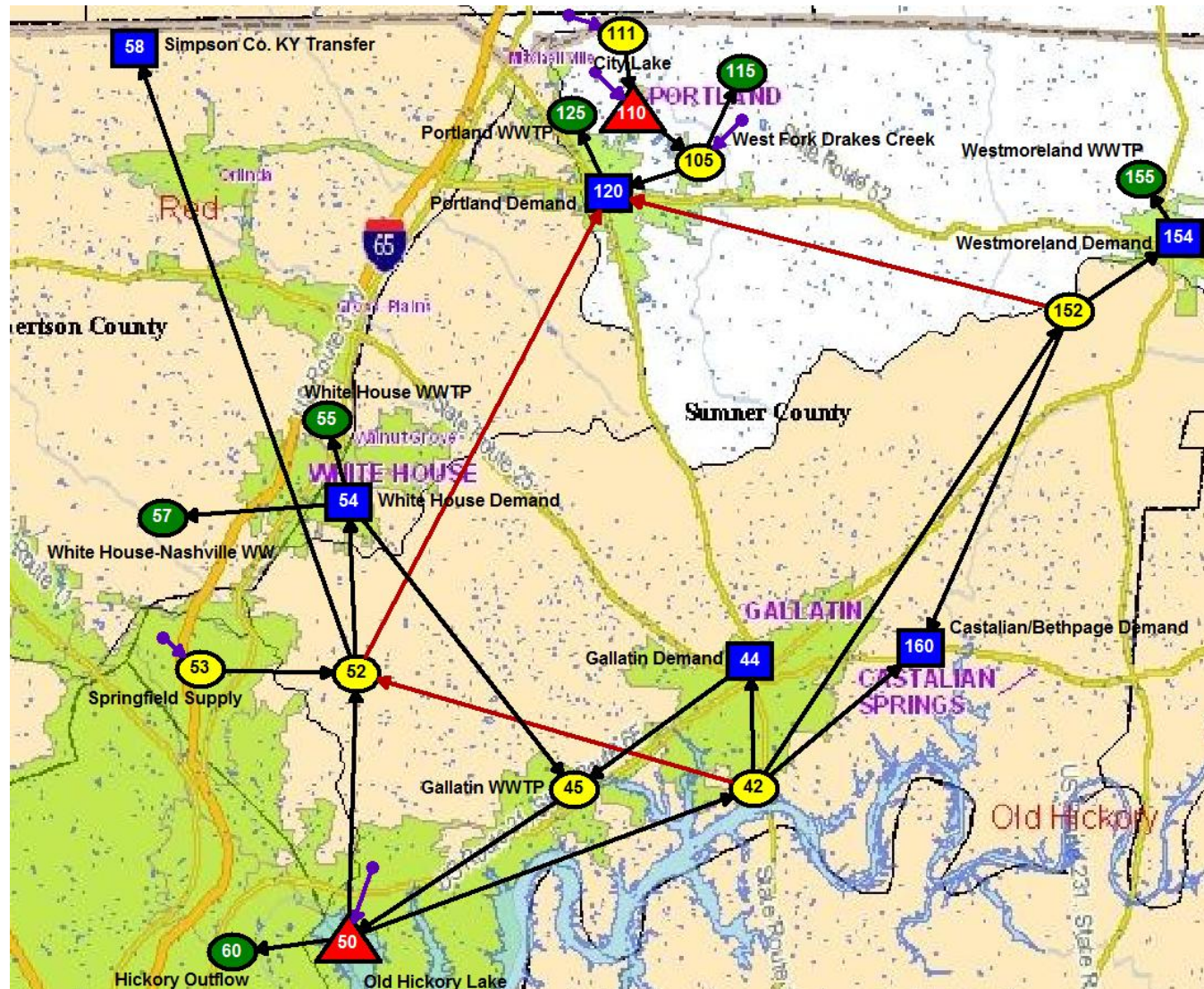
# North Central Scenarios

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- 1) Existing
- 2) Proposed drought plans, no transfers
- 3) Proposed drought plans & transfers
- 4) Structural alternatives

Use 2030 demands for all scenarios

# North Central Schematic



# Existing scenario

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- Simulate existing storage and operations for all utilities using 2030 demand levels
- No transfers except ‘normal’ transfers
  - Gallatin to Westmoreland & Castalian/Bethpage
  - Westmoreland to Castalian/Bethpage
  - White House to Simpson Co., KY

# Proposed drought plans scenarios

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- Simulate existing storage and operations for all utilities using 2030 demand levels
- No transfers except 'normal' transfers
- Portland adheres to proposed drought plans based on storage levels in own system
  - Stage 1 demand reductions = 10%
  - Stage 2 demand reductions = 20%



# Proposed drought plans & transfers scenarios

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- Simulate existing storage and operations for all utilities using 2030 demand levels
- Emergency transfers allowed
  - White House to Portland transfers triggered by creek flows & storage levels
- Portland adheres to proposed drought plans based on storage levels in own system
  - Stage 1 demand reductions = 10%
  - Stage 2 demand reductions = 20%

# Structural alternatives

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- Simulate proposed structural alternatives using 2030 demand levels
  - Caney Fork Creek Reservoir



# North Central alternatives summary

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Scenario	Meets storage objective?	Meets frequency objective?
Existing	No	n/a
Proposed drought plan	No	No
Proposed drought plan & transfers	Yes	Yes
Caney Fork Creek Reservoir	Yes	n/a

# Existing scenario

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<b>Utility</b>	<b>Below 20% once every</b>	<b>Max # days below 20%</b>	<b>Min. Storage</b>
Portland – City Lake	27 yrs	98	0 MG 0%

# Portland proposed drought plan & transfers scenario

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- Transfer from White House to Portland
  - Daily transfer volume is amount of Portland's demand in excess of full treatment capacity (3.0 mgd)
  - Otherwise transfer 20% of demand when there is not sufficient flow in WF Drakes Creek and City Lake is below full
- Portland drought plan
  - Stage 1
    - Trigger = 70% usable storage remaining
    - Demand reduction = 10%
  - Stage 2
    - Trigger = 50% usable storage remaining
    - Demand reduction = 20% (total)

# Portland proposed drought plan & transfers scenario

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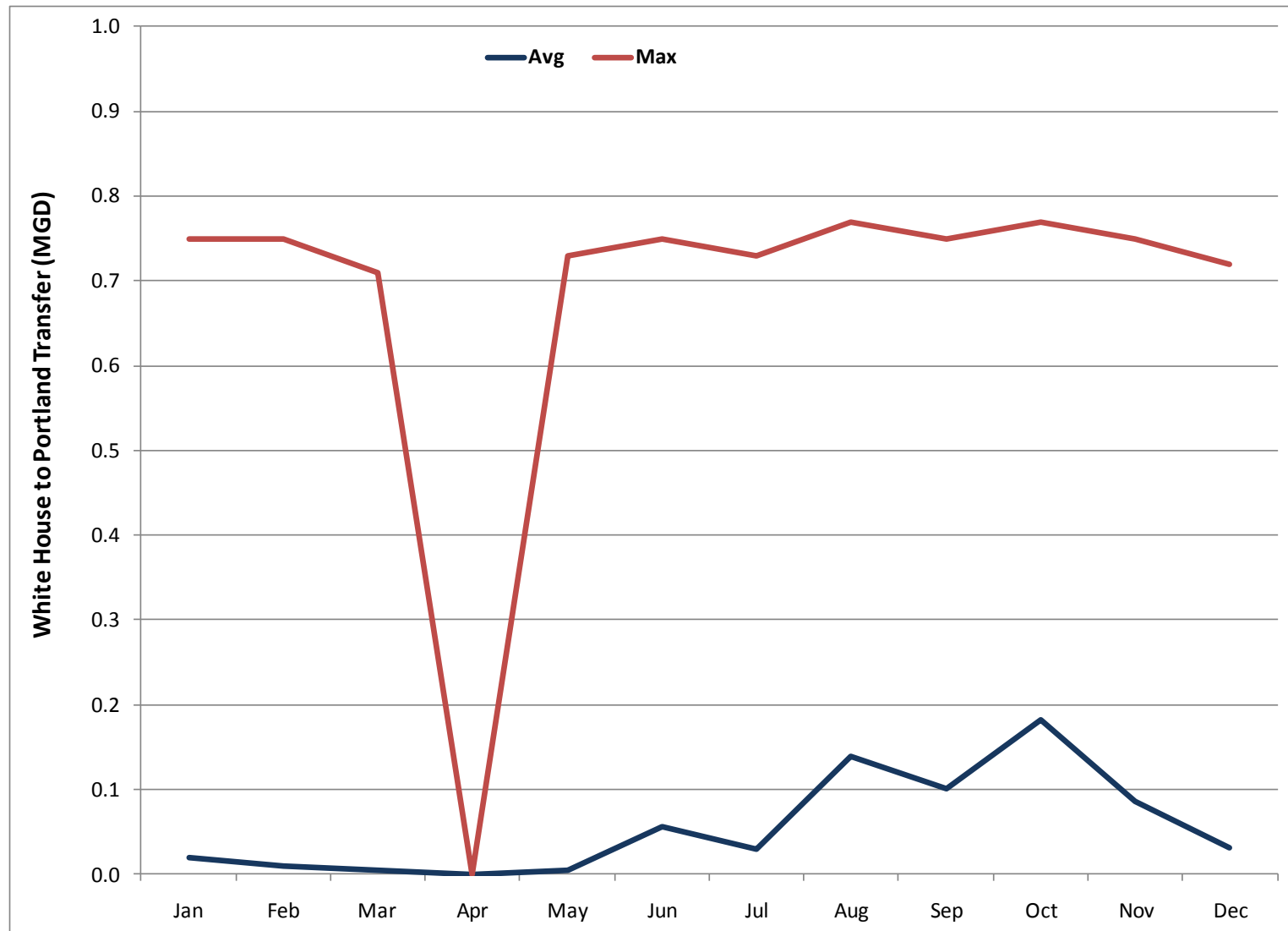
<b>Below 20% once every</b>	<b>Max days below 20%</b>	<b>Min. Storage</b>	<b>Ph. 2 events once every</b>	<b>Ph. 3 events once every</b>	<b>Max # days in restrictions</b>
Never	Never	22 MG (26%)	27 yrs	80 yrs	151

# Portland proposed drought plan & transfers scenario

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# Transfer events once every	Avg/Max # days with transfers	Avg/Max amount transferred
< 1 year	27 / 89	0.10 / 0.77 MGD

# Transfers by month, proposed drought plan & transfers scenario



# Caney Fork Creek Reservoir alternative

- Ran 2030 existing scenario w/ new reservoir
  - No drought plan, no transfers
- Results
  - No shortages
  - Storage never drops below 20%
- Could maintain a constant minimum flow of 3.85 cfs downstream of the WF Drakes intake
  - 2.2 mgd min. release downstream of the reservoir



# Questions / Discussion

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# Extra slides

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# City Lake

